

Overview of Water Quality Monitoring

In Montgomery County

May 10, 2021

Water Quality Advisory Group



Ken Mack

DEPARTMENT OF
**ENVIRONMENTAL
PROTECTION**

MONTGOMERY COUNTY • MARYLAND

www.montgomerycountymd.gov/DEP



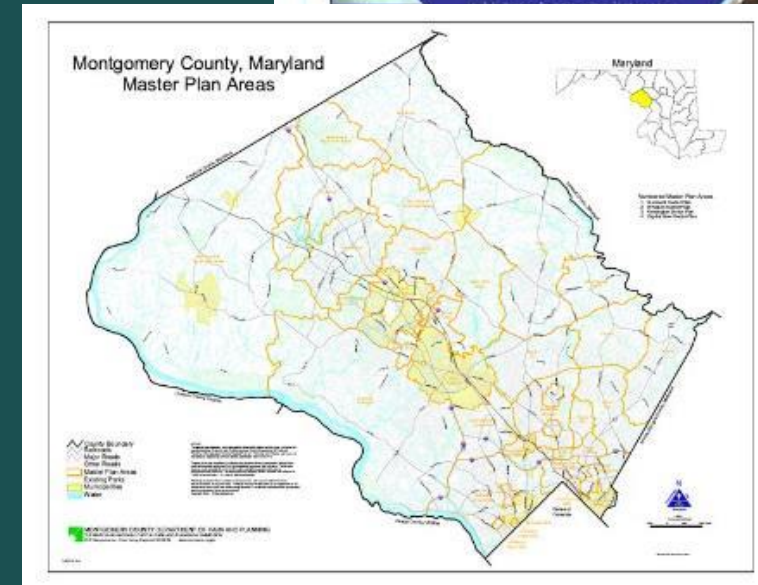
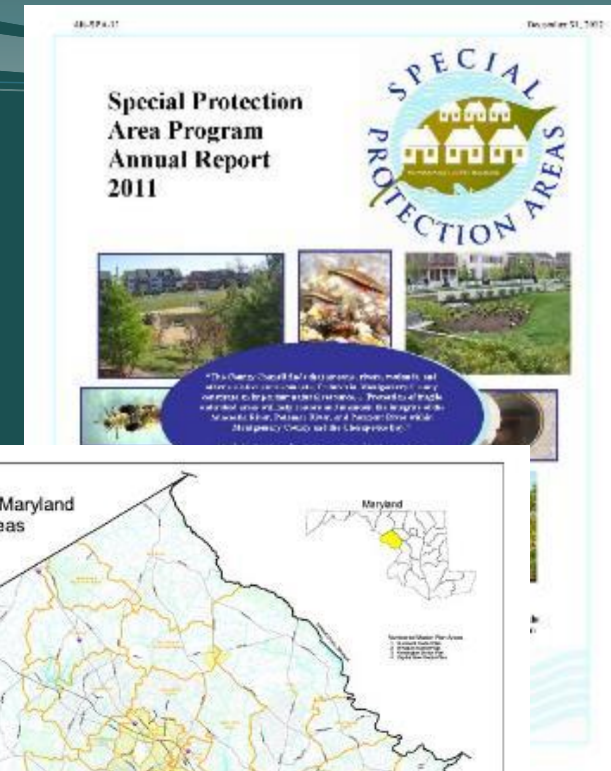
Overview

- Monitoring Overview
 - Biological Monitoring
 - Habitat Monitoring/Geomorphology Monitoring
- USGS Monitoring
- NPDES/MS4 Monitoring
 - Breewood
 - New Monitoring Requirements
- Special Protection Area Monitoring
- Stream Restoration Verification
- Questions



Why We Monitor...

- ▶ DEP Programs
 - ▶ MS4/NPDES Program
 - ▶ Baseline Conditions
 - ▶ Special Protection Areas
 - ▶ Stream Restoration
 - ▶ Special Projects
 - ▶ Water Quality Incidents



What We do...



Benthic Macroinvertebrates Monitoring



Fish Sampling



Sensitive
Tolerant



[illegible]

ICMAD
STATION

MCDEP SPRING HABITAT DATA SHEET

Page 1 of 3

Station ID: 1018

Stream ID: 1018

Date: 2/27/14

Crew: WJW

Basin: 1018

Site Name: Basin 1018

Office Use Only

WBSB Site #

Line Name: 1018

2nd Recorder: WJW

3rd Recorder: WJW

Distance from Nearest Road to Site (m): 117

Trat Rating 0 - 20 (see back): 117

LANDUSE (Y/N)

☒ Old Field

☒ Agricultural Forest

☒ Pasture

☒ Wetland

☒ Barren Soil

☒ Landfill

☒ Surface Mine

☒ Recreation/Recreation

☒ Pasture

☒ Forest

☒ Orchard/Orchard/Horticulture

☒ Golf Course

RIPARIAN VEGETATION

Left Bank: 1018

Right Bank: 1018

Buffer Drain Type: 1018

WATER QUALITY

Water Temp (°C): 1018

Water Temp (°F): 1018

Water Depth (cm): 1018

Water Depth (ft): 1018

Water Velocity (m/s): 1018

Water Velocity (ft/s): 1018

Water Color: 1018

Water Turbidity: 1018

Water Conductivity: 1018

Water pH: 1018

Water Dissolved Oxygen: 1018

Water Dissolved Oxygen Saturation: 1018

Water Dissolved Oxygen Deficit: 1018

Water Dissolved Oxygen Saturation Deficit: 1018

Water Dissolved Oxygen Saturation Deficit: 1018

CANALIZATION

Canal ID: 1018

Canal Name: 1018

Canal Type: 1018

Canal Material: 1018

Canal Width: 1018

Canal Depth: 1018

Canal Flow: 1018

Canal Velocity: 1018

Canal Turbidity: 1018

Canal Conductivity: 1018

Canal pH: 1018

Canal Dissolved Oxygen: 1018

Canal Dissolved Oxygen Saturation: 1018

Canal Dissolved Oxygen Deficit: 1018

Canal Dissolved Oxygen Saturation Deficit: 1018

Canal Dissolved Oxygen Saturation Deficit: 1018

GPS Coordinates (60 m)

Map Datum: 1018

Map Scale: 1018

Map Projection: 1018

Map Units: 1018

Map Contour: 1018

Map Elevation: 1018

Map Slope: 1018

Map Aspect: 1018

Map Orientation: 1018

Map Accuracy: 1018

Map Precision: 1018

Map Resolution: 1018

Map Detail: 1018

Map Annotation: 1018

Map Legend: 1018

Map Title: 1018

Map Author: 1018

Map Date: 1018

Map Version: 1018

Map Status: 1018

Map Comments: 1018

Database Entry

Database Name: 1018

Database Type: 1018

Database Location: 1018

Database Access: 1018

Database User: 1018

Database Password: 1018

Database Connection: 1018

Database Query: 1018

Database Result: 1018

Database Error: 1018

Database Message: 1018

Database Status: 1018

Database Action: 1018

Database Comment: 1018

Physical Channel Analysis

Channel ID: 1018

Channel Name: 1018

Channel Type: 1018

Channel Material: 1018

Channel Width: 1018

Channel Depth: 1018

Channel Flow: 1018

Channel Velocity: 1018

Channel Turbidity: 1018

Channel Conductivity: 1018

Channel pH: 1018

Channel Dissolved Oxygen: 1018

Channel Dissolved Oxygen Saturation: 1018

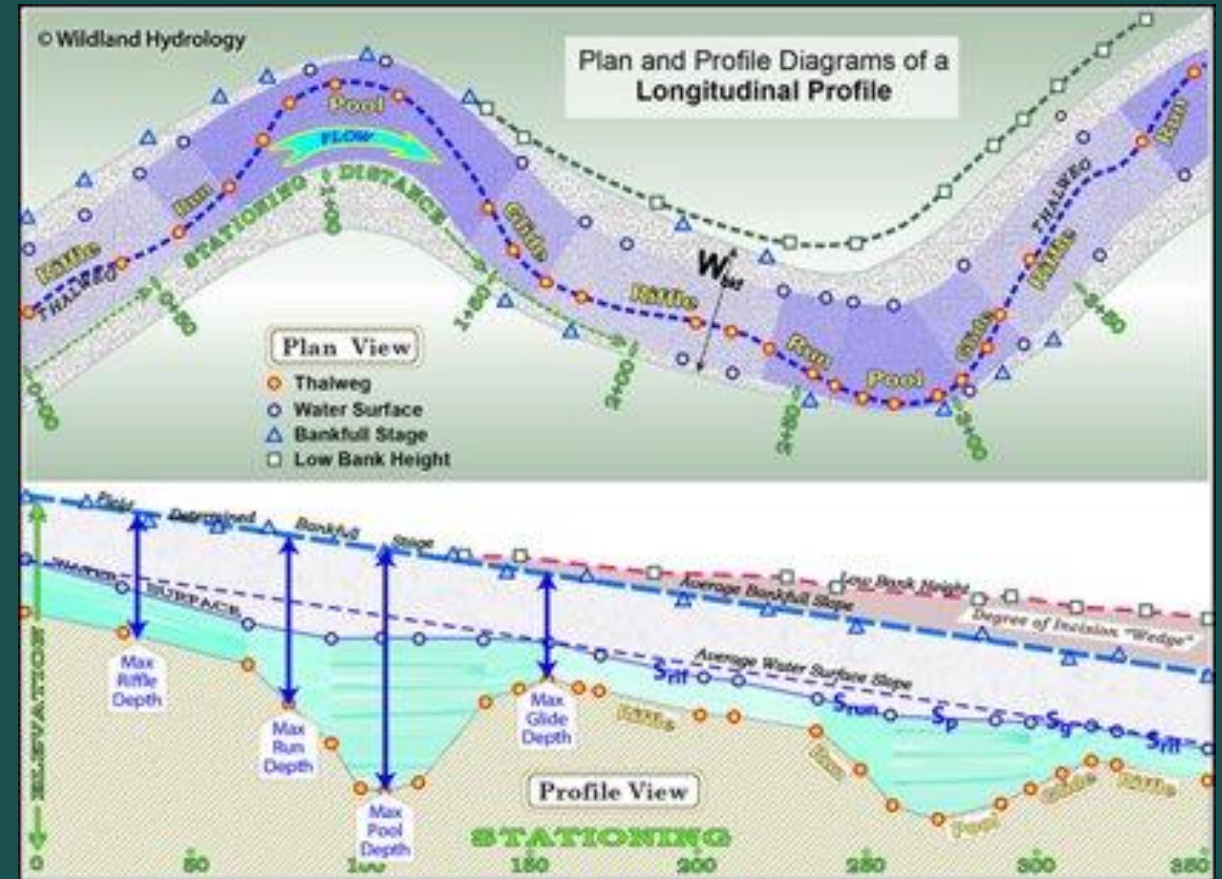
Channel Dissolved Oxygen Deficit: 1018

Channel Dissolved Oxygen Saturation Deficit: 1018

Channel Dissolved Oxygen Saturation Deficit: 1018

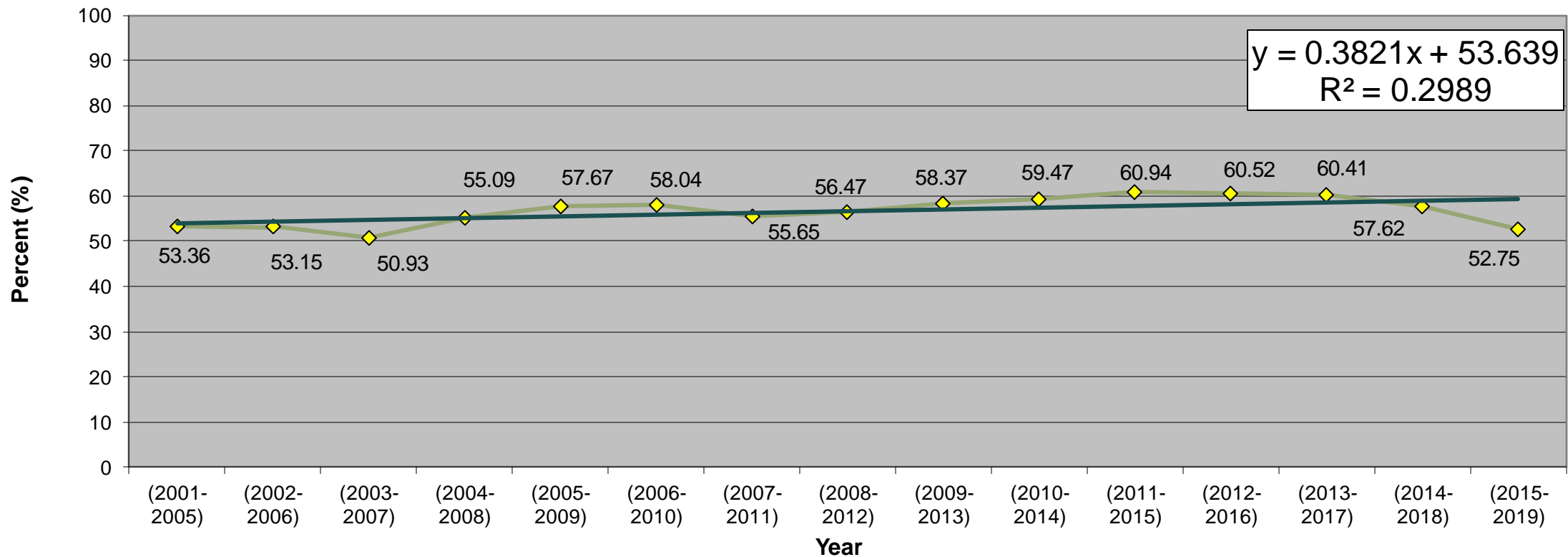
Geomorphology

- Fluvial geomorphology:
 - The study of the form and function of streams and the interaction between streams and the landscape around them.



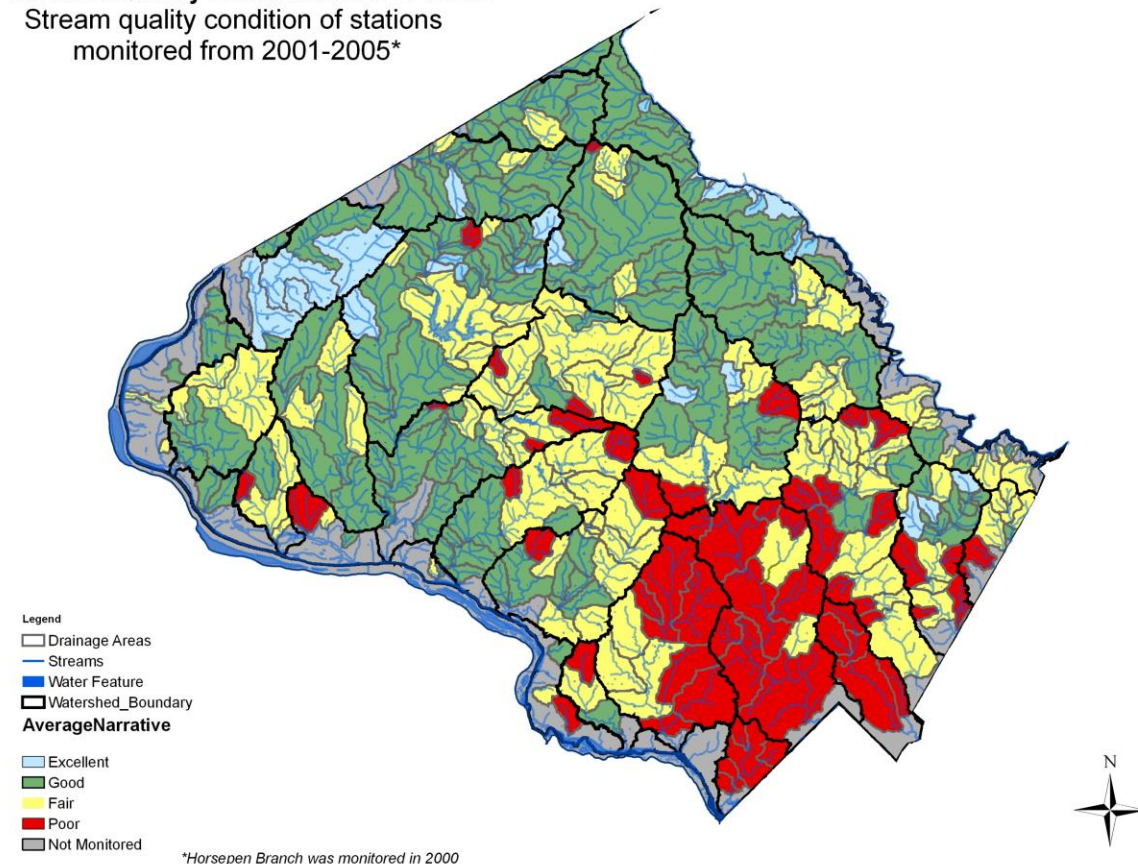
Stream Conditions over Times

Percent of Stations Rated Good to Excellent

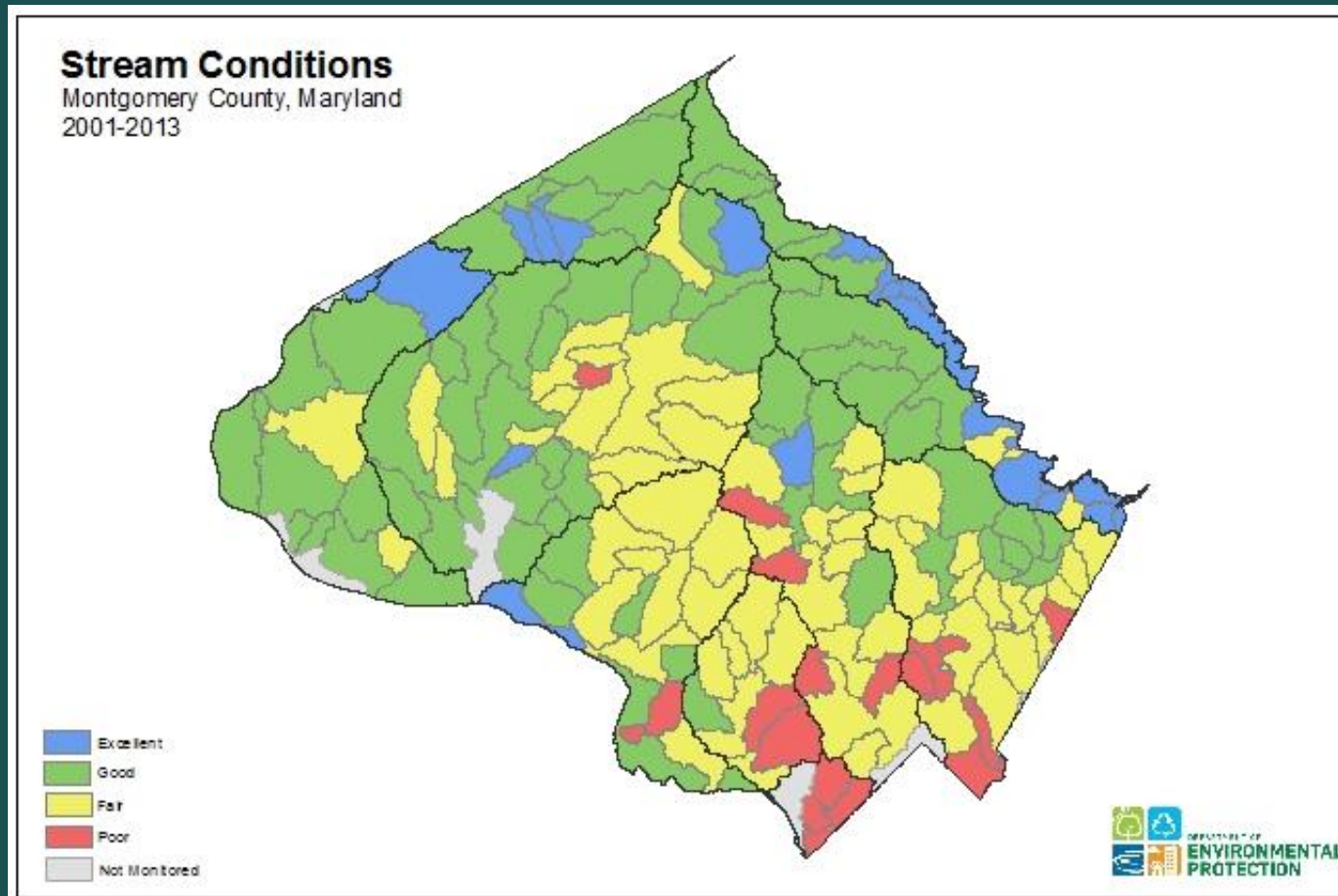


Round 2 Stream Conditions

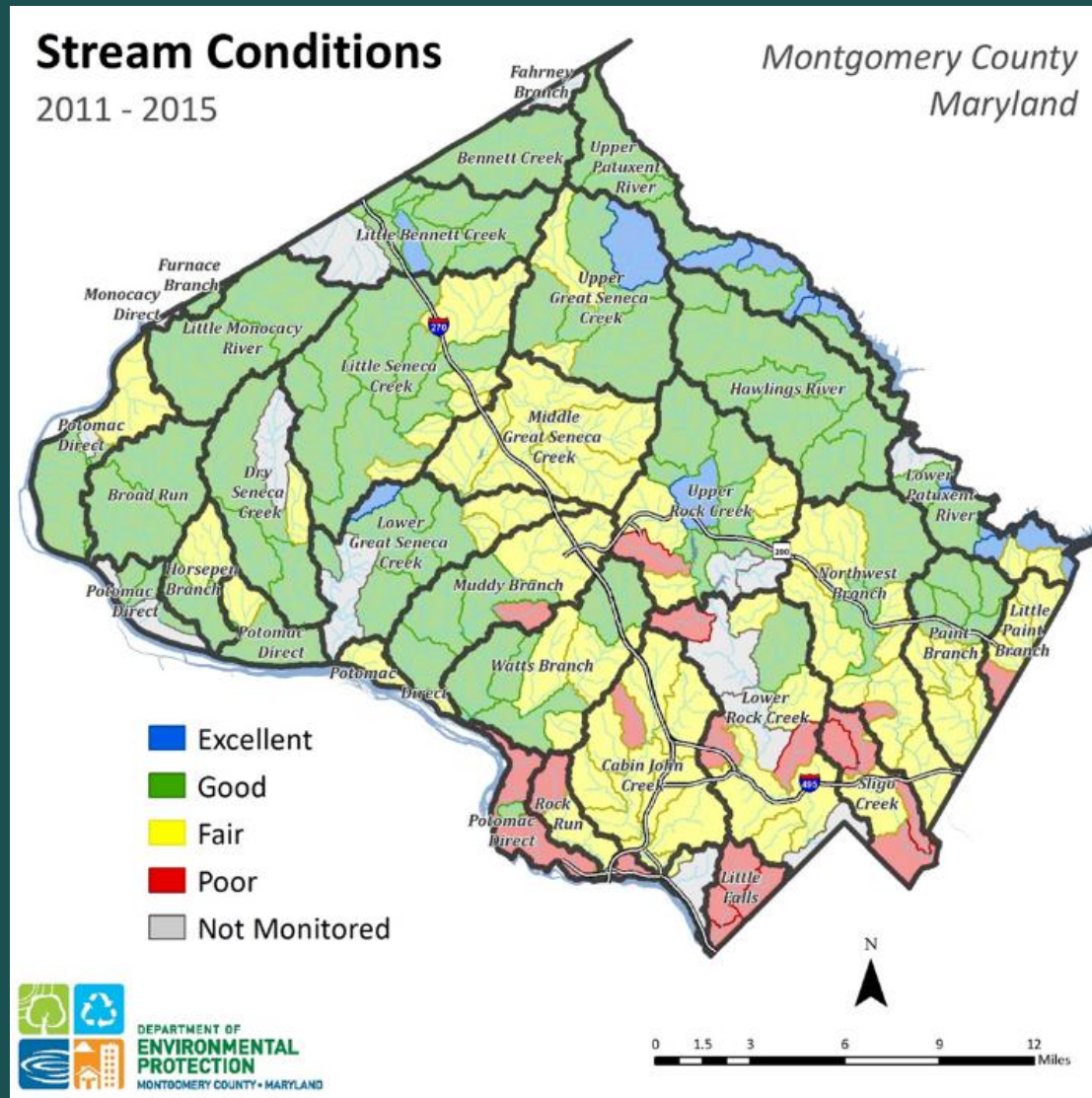
Stream Quality Conditions 2001-2005
Stream quality condition of stations
monitored from 2001-2005*



Round 3 Update



Round 4 Update

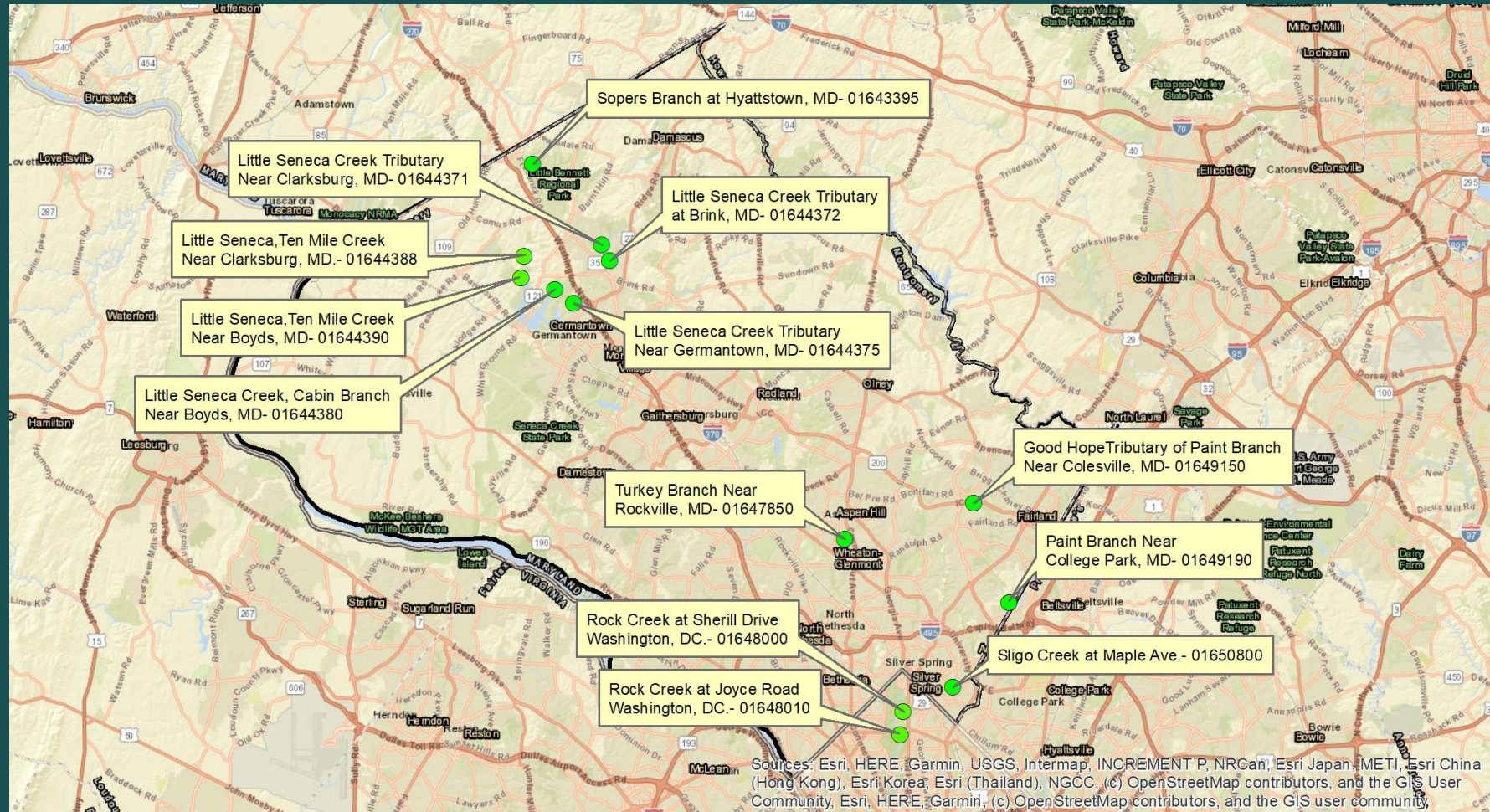


Round 5 Update

**Coming
Soon!**

USGS Monitoring

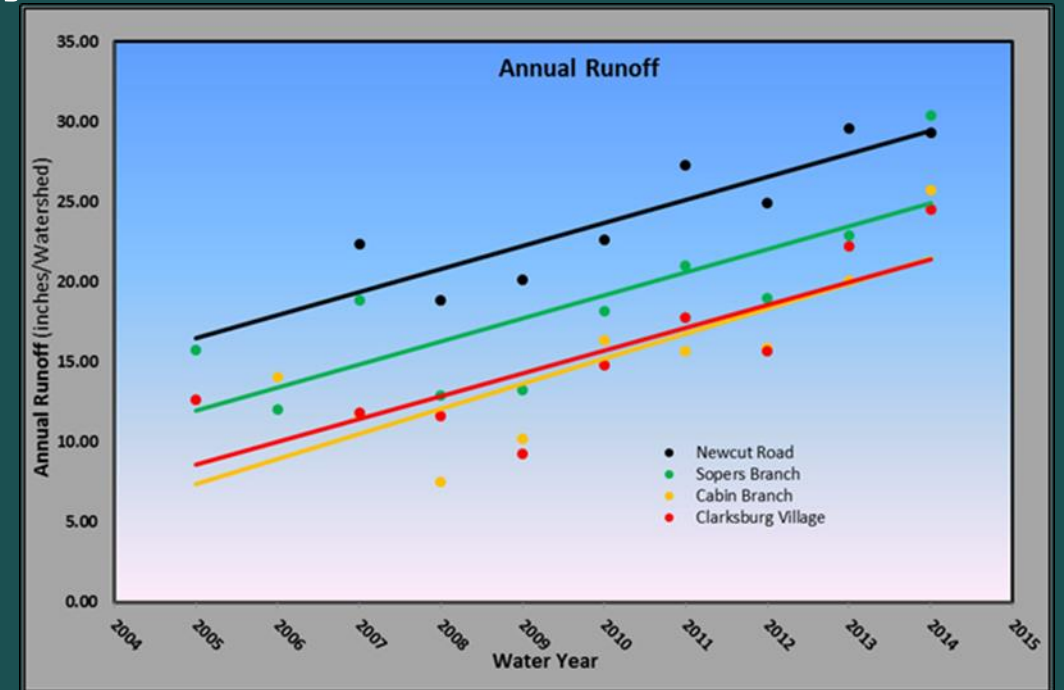
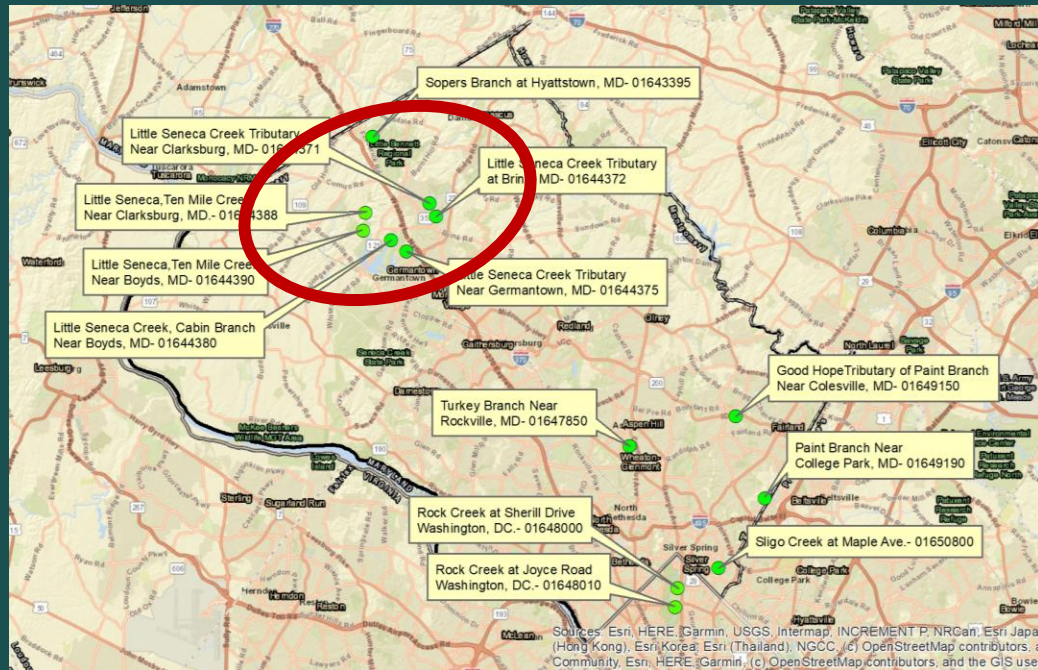
Flow and select chemistry monitoring across the County



USGS Monitoring

Flow and select chemistry monitoring across the County

- Annual stream discharge is continuing increase across the Northern portion of the County



Breewood Case Study

- ✓ 42% impervious
- ✓ County Property: Green Streets
- ✓ Private Property:
 - ✓ County Construction
 - ✓ Voluntary
- ✓ Stream Restoration
- ✓ 36% 69% Treatment



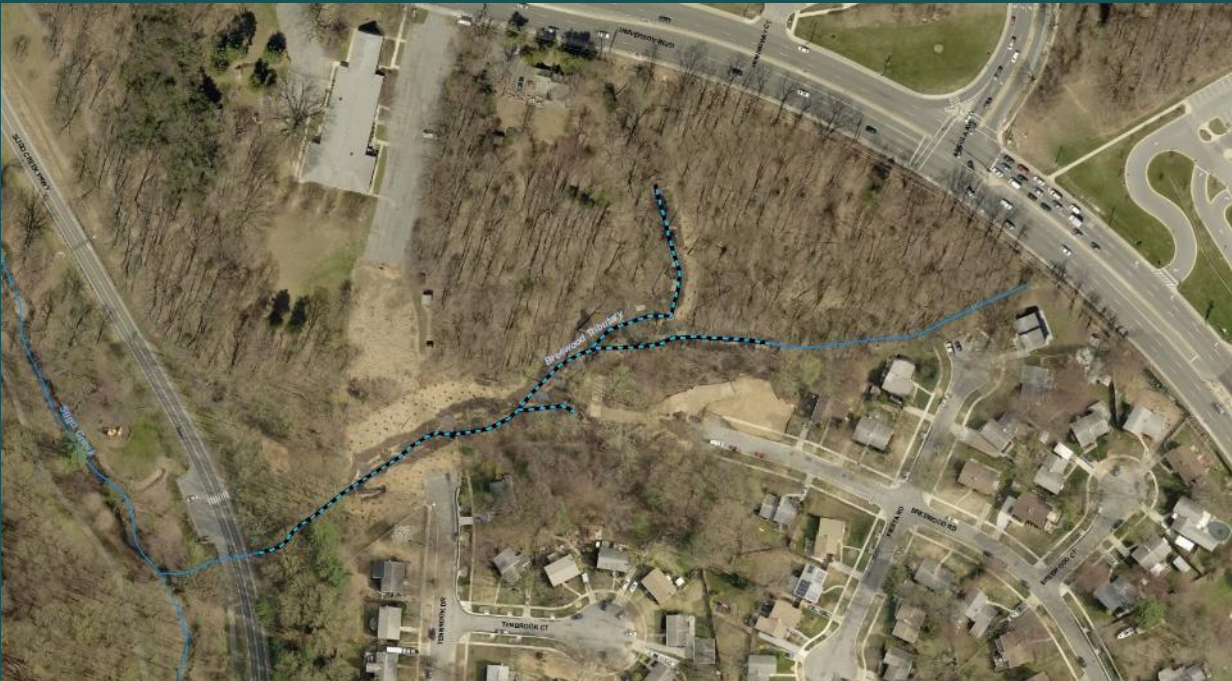
Breewood Case Study:

Watershed Restoration

- ✓ Completed 2018
- ✓ Extensive use
 - ✓ Rainscapes
 - ✓ BMPs
 - ✓ Greenstreets
 - ✓ Stream Restoration



- ✓ Regenerative Stormwater Conveyance
- ✓ 1,200 Linear Feet



Breewood Case Study:

Before and After



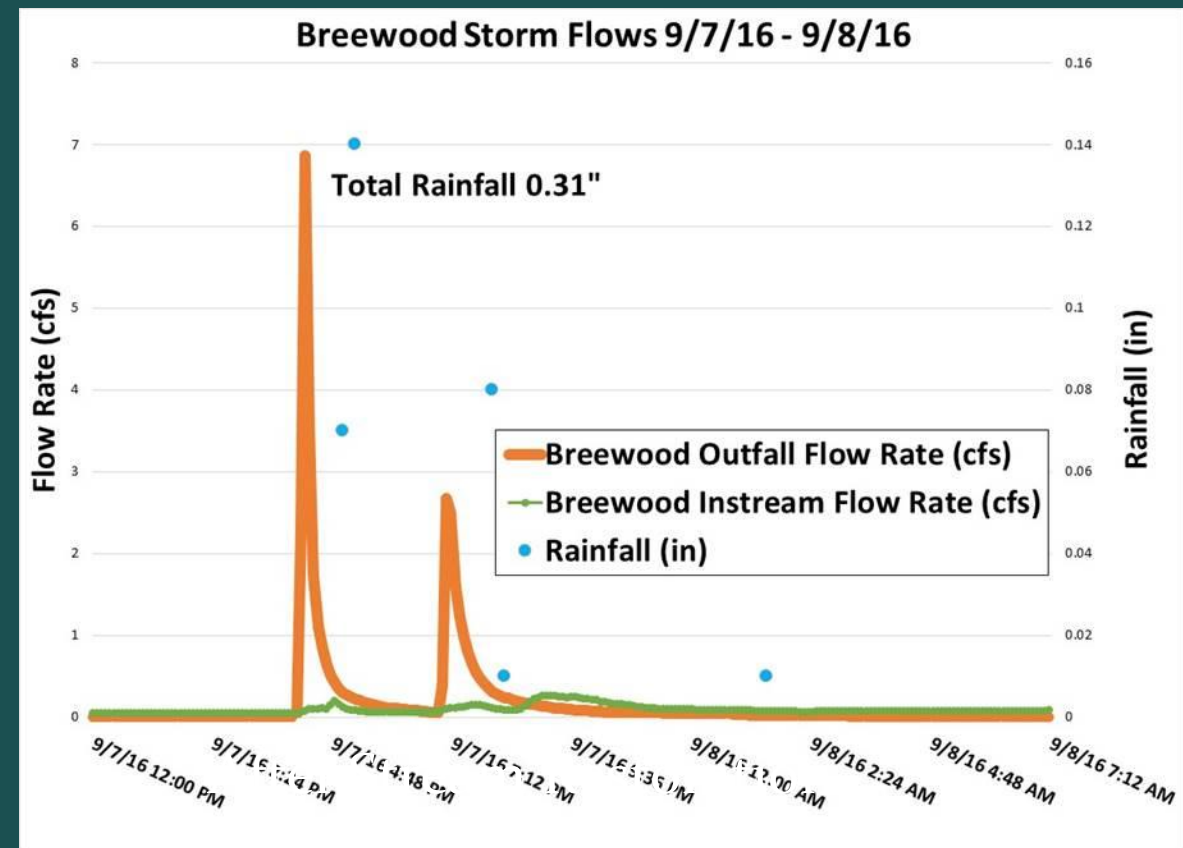
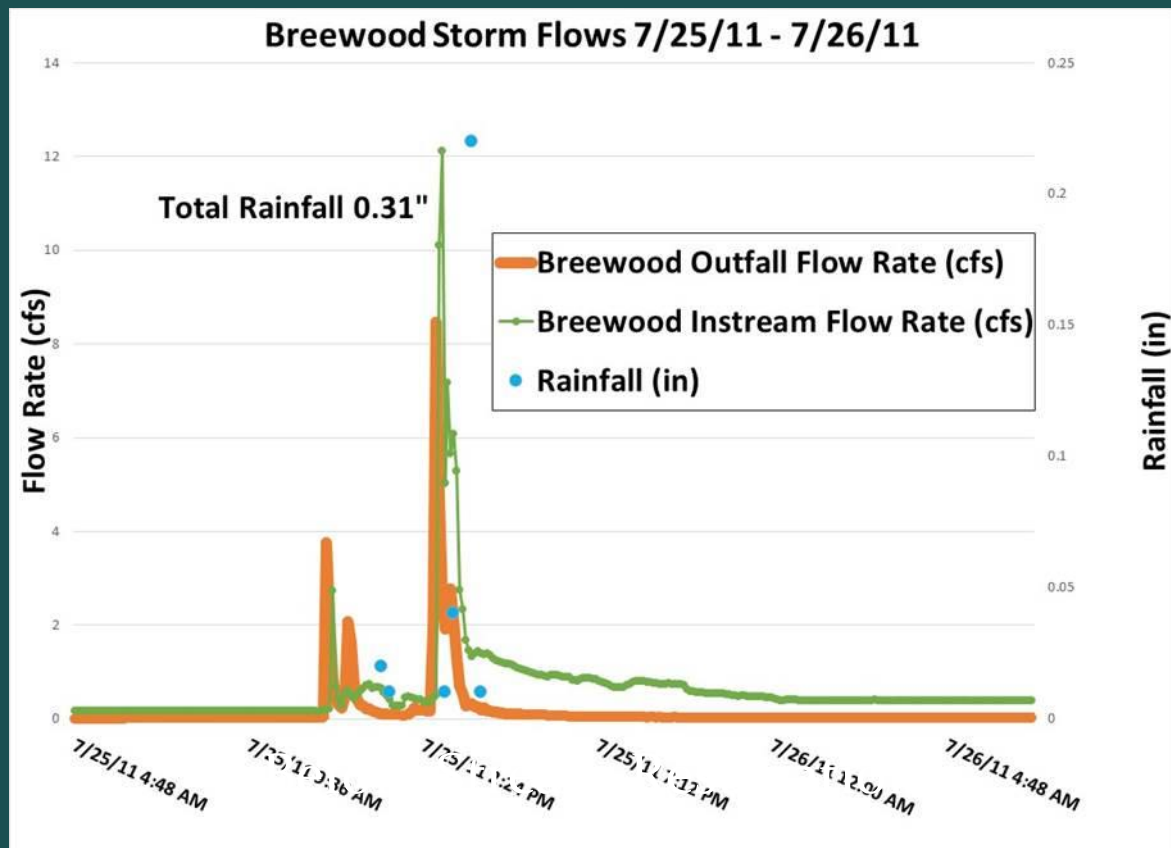
Breewood Case Study:

Water Quality Monitoring

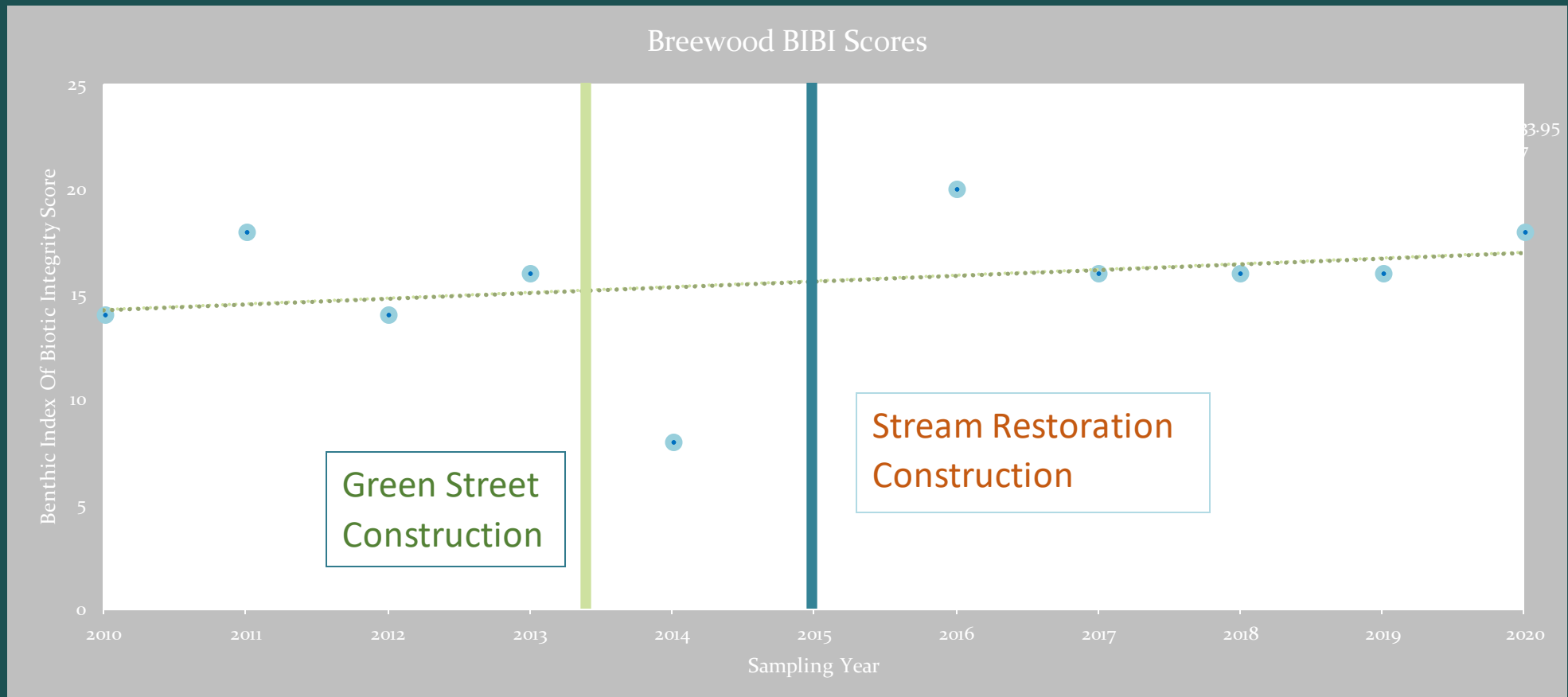
- ✓ (2) Automated Flow and Chemistry Stations
 - ✓ Enterococcus
 - ✓ Biochemical Oxygen Demand
 - ✓ Hardness
 - ✓ Nitrate+Nitrite, Total Kjeldahl Nitrogen
 - ✓ Total Petroleum Hydrocarbons
 - ✓ Total Phosphorus
 - ✓ Total Suspended Solids
 - ✓ Total Cadmium
 - ✓ Total Copper, Lead, Zinc



Breewood Case Study: Reduced Stormflow



Breewood Case Study: Biological Health



Breewood Case Study:

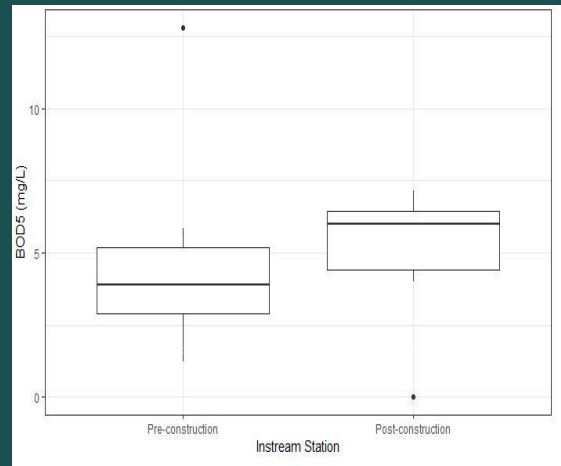
Water Chemistry

EMCs
(Small
Storms; \geq
0.3", \leq 0.75")

BOD

$n = 7$

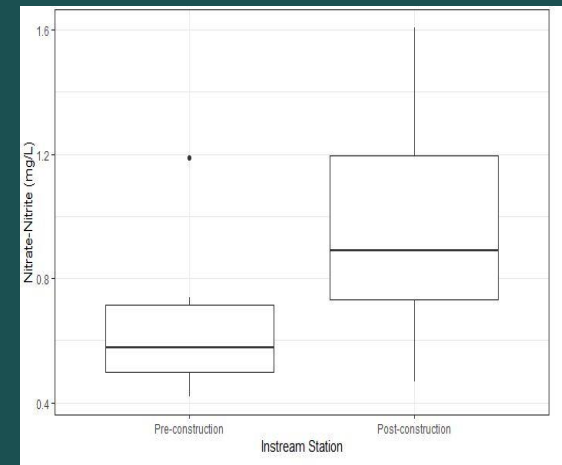
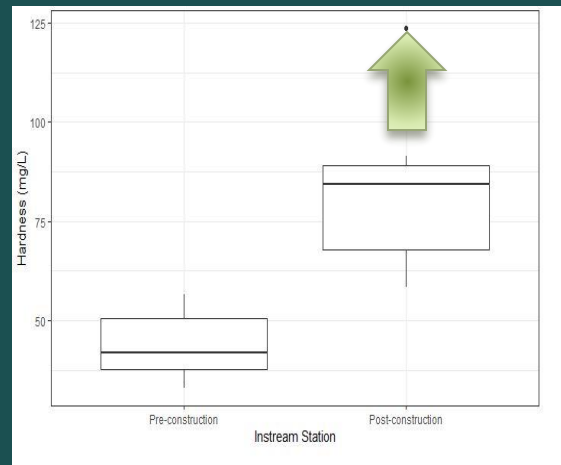
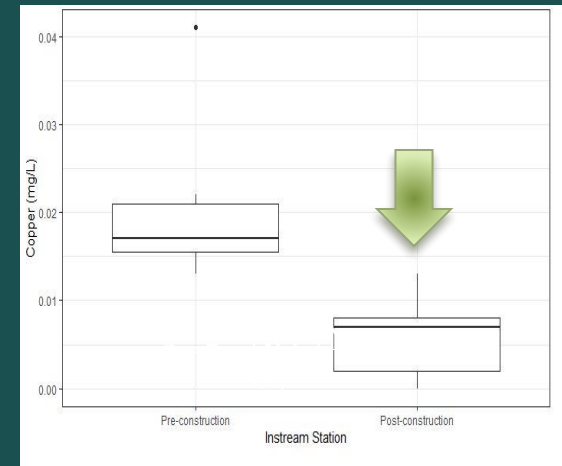
$n = 7$



Copper

$n = 7$

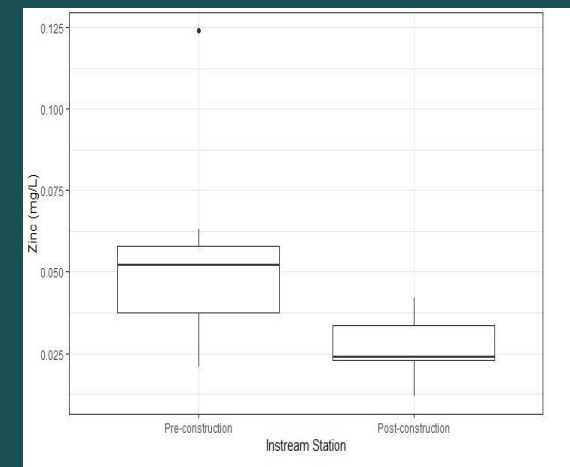
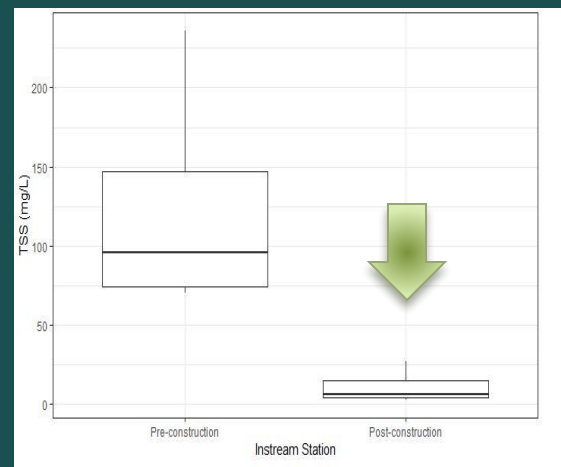
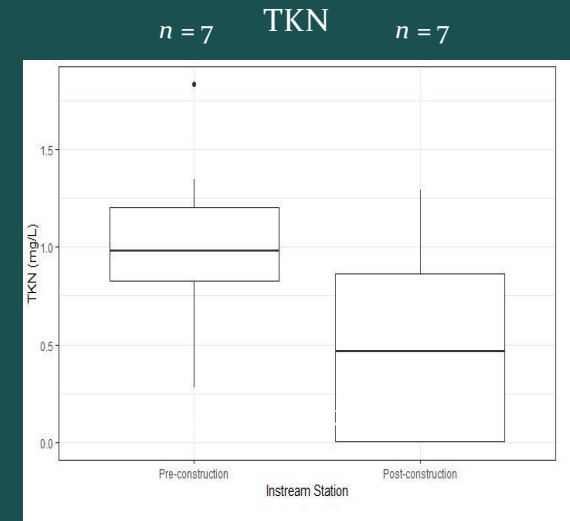
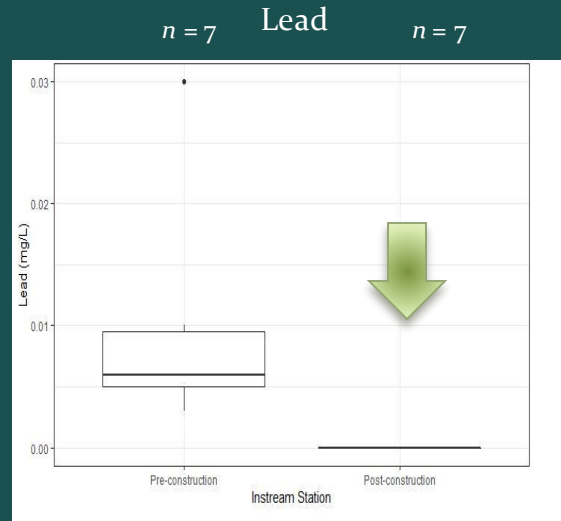
$n = 7$



Breewood Case Study:

Water Chemistry

EMCs
(Small
Storms; \geq
0.3", \leq 0.75")

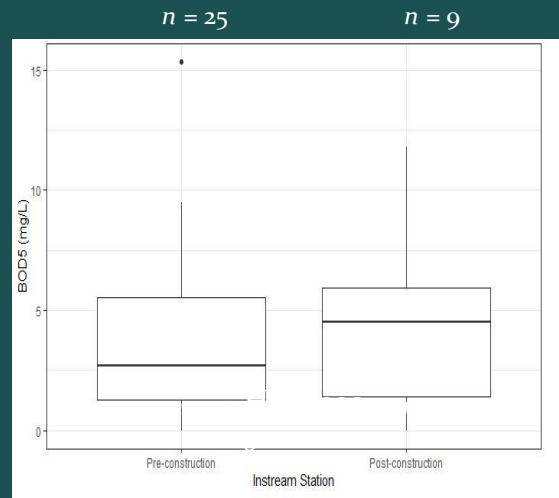


Breewood Case Study:

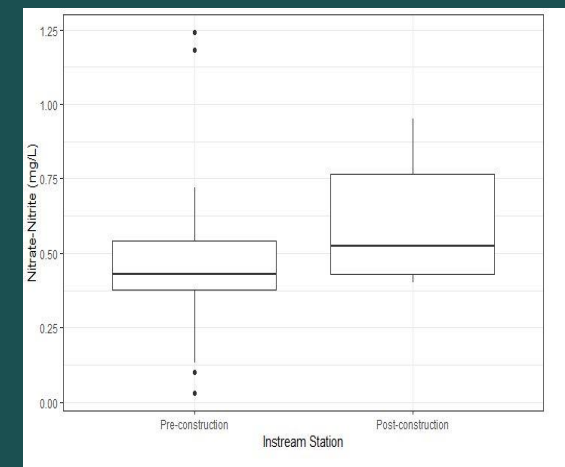
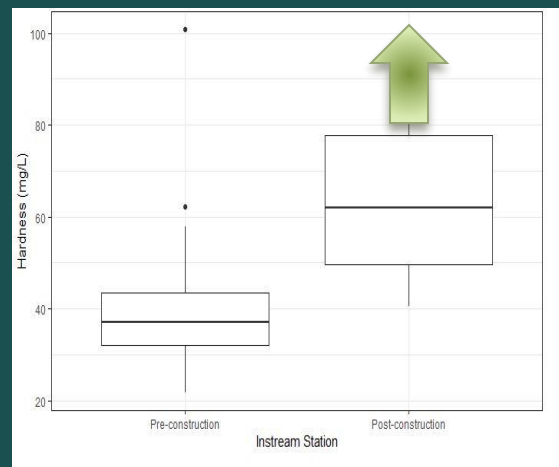
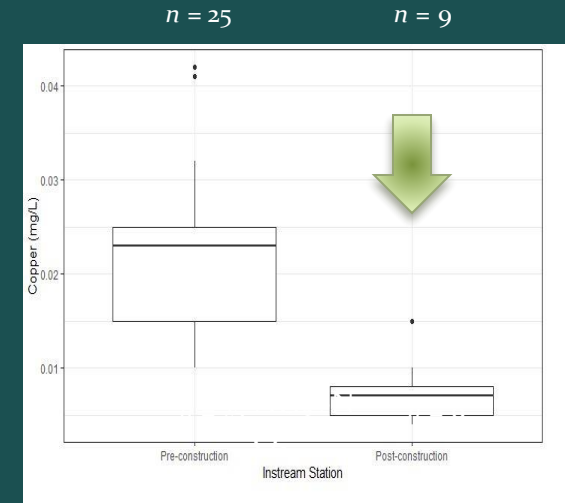
Water Chemistry

EMCs
(Large Storms;
0.77" to 3.35")

BOD



Copper



Breewood Case Study:

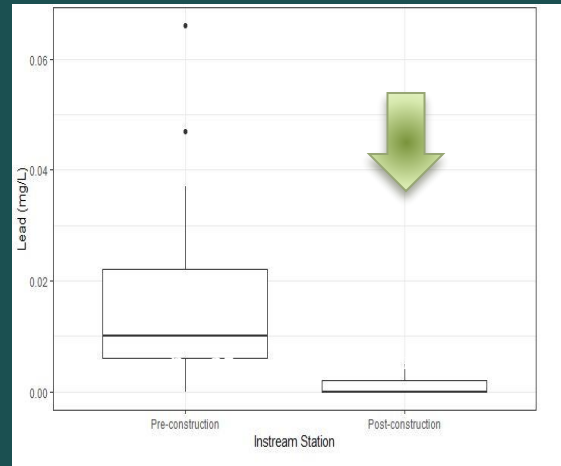
Water Chemistry

EMCs
(Large Storms;
0.77" to 3.35")

Lead

$n = 25$

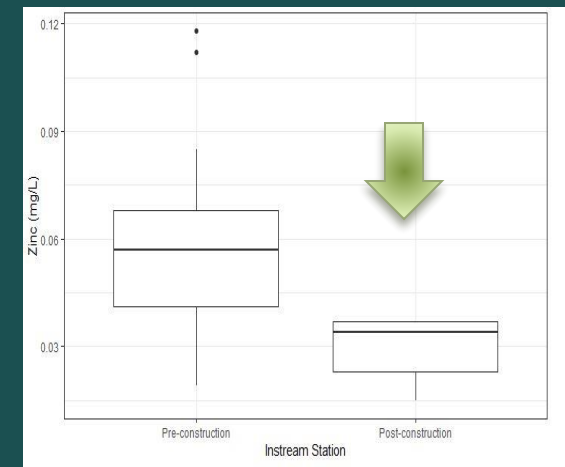
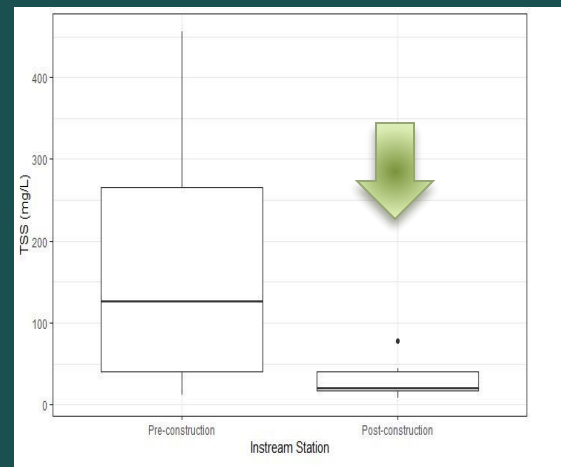
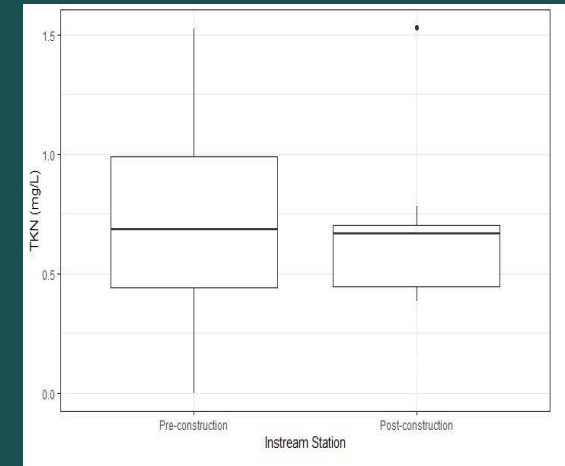
$n = 9$



TKN

$n = 25$

$n = 9$

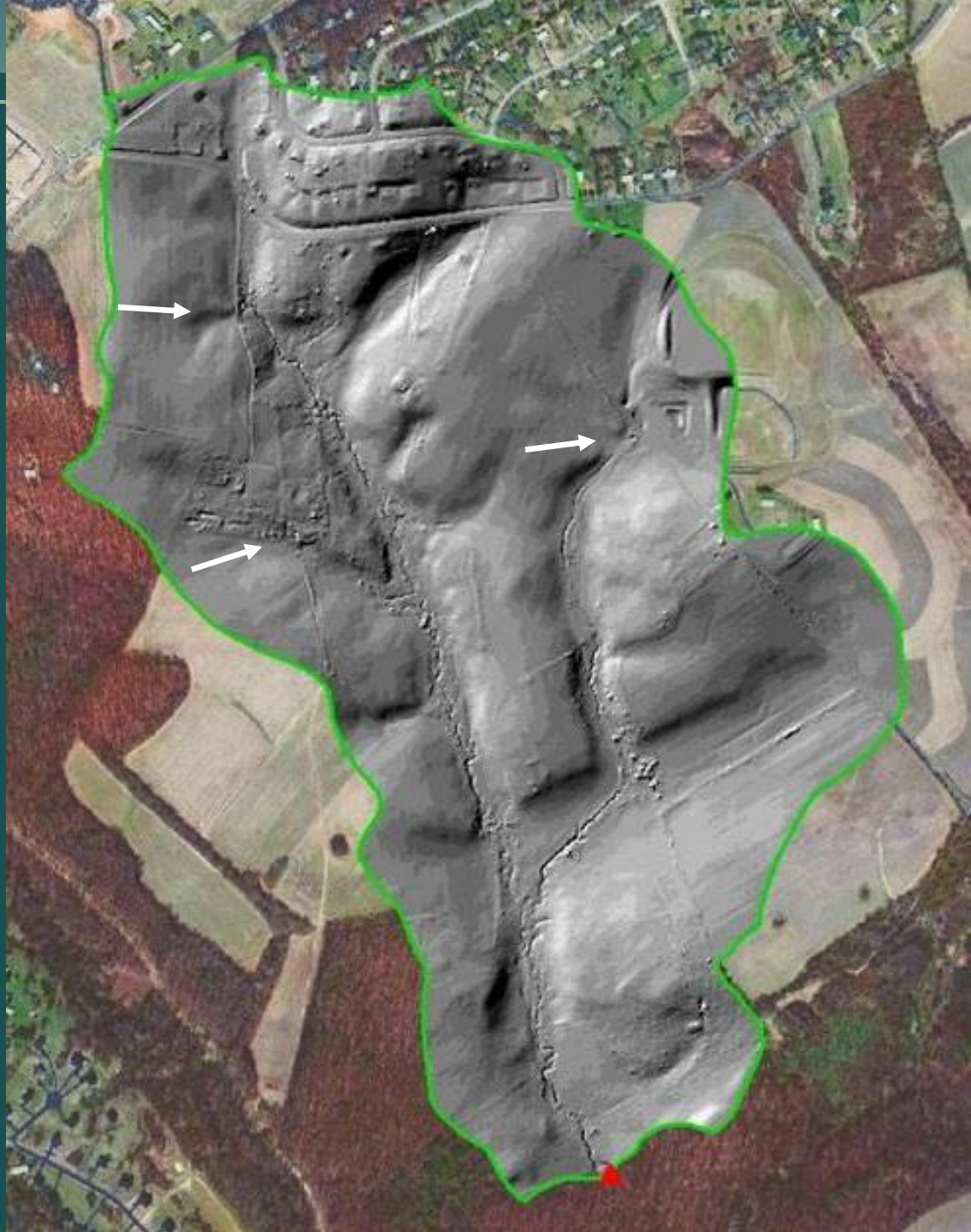


Special Protection Areas (SPAs)



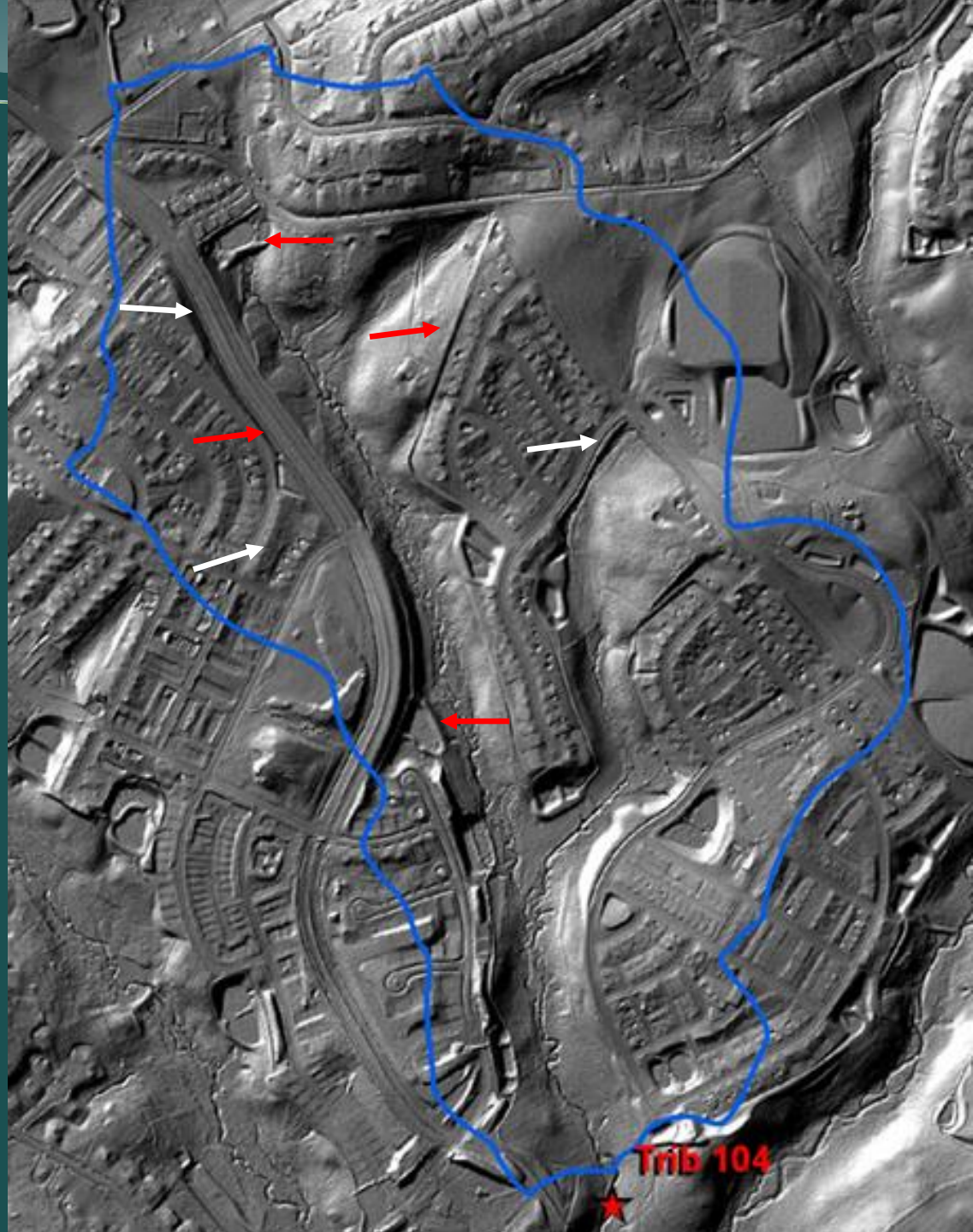
Development and watersheds

Clarksburg
2002

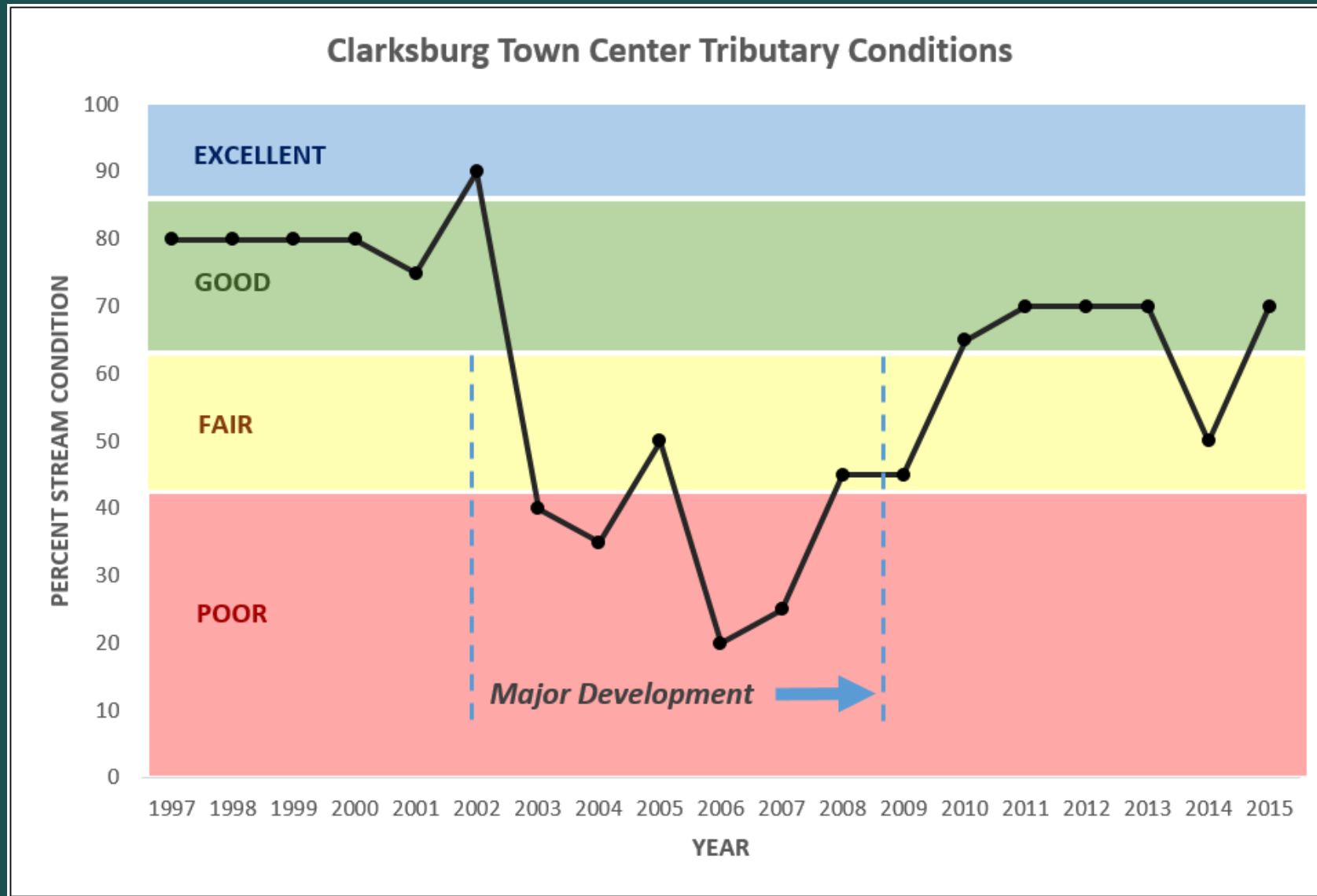


Development and watersheds

Clarksburg
2007



Clarksburg Stream Conditions Trend

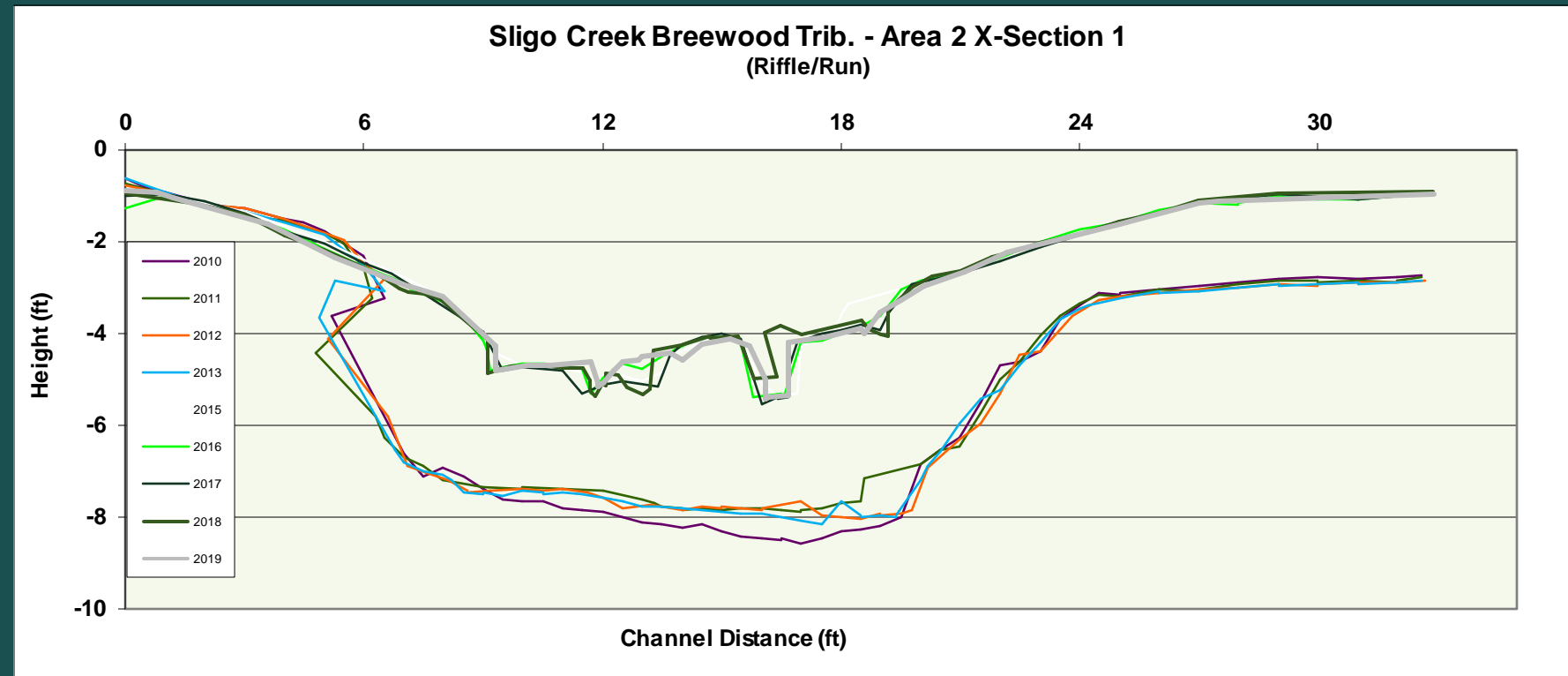


Stream Restoration Verification

- Geomorphology
 - Long Pro
 - Cross Sections
- Reforestation
- Wetlands
- Photos



Stream Restoration Verification



New MS4 Requirements

- “Montgomery County shall conduct BMP effectiveness and watershed assessment monitoring, and polychlorinated biphenyls (PCB) source tracking for assessing progress toward improving local water quality and restoring the Chesapeake Bay.”
 - BMP Effectiveness Watershed monitoring (Breewood)
 - Chemical (Storm flow, base flow, and continuous)
 - Biological
 - Geomorphology
 - Watershed Assessment (Countywide)
 - Biological Monitoring
 - Chloride Monitoring (Conductivity)
 - Bacteria Monitoring

Thank you!

Questions?



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